Aug. 4, 1931. W. G. SMITH 1,817,498

ICE CREAM MAKING UNIT

Filed Feb. 27, 1928 3 Sheets-Sheet 1

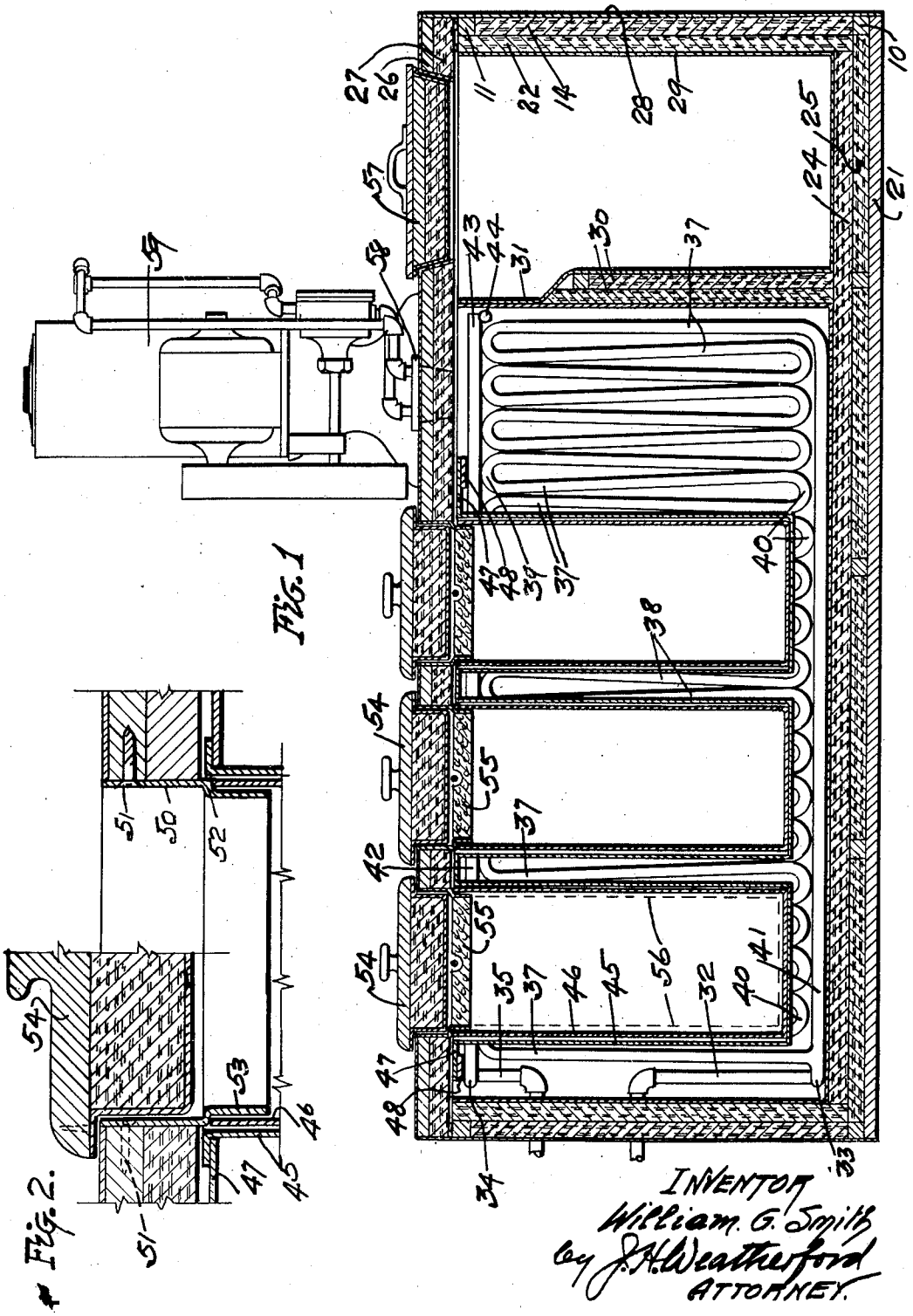


Fig. 1

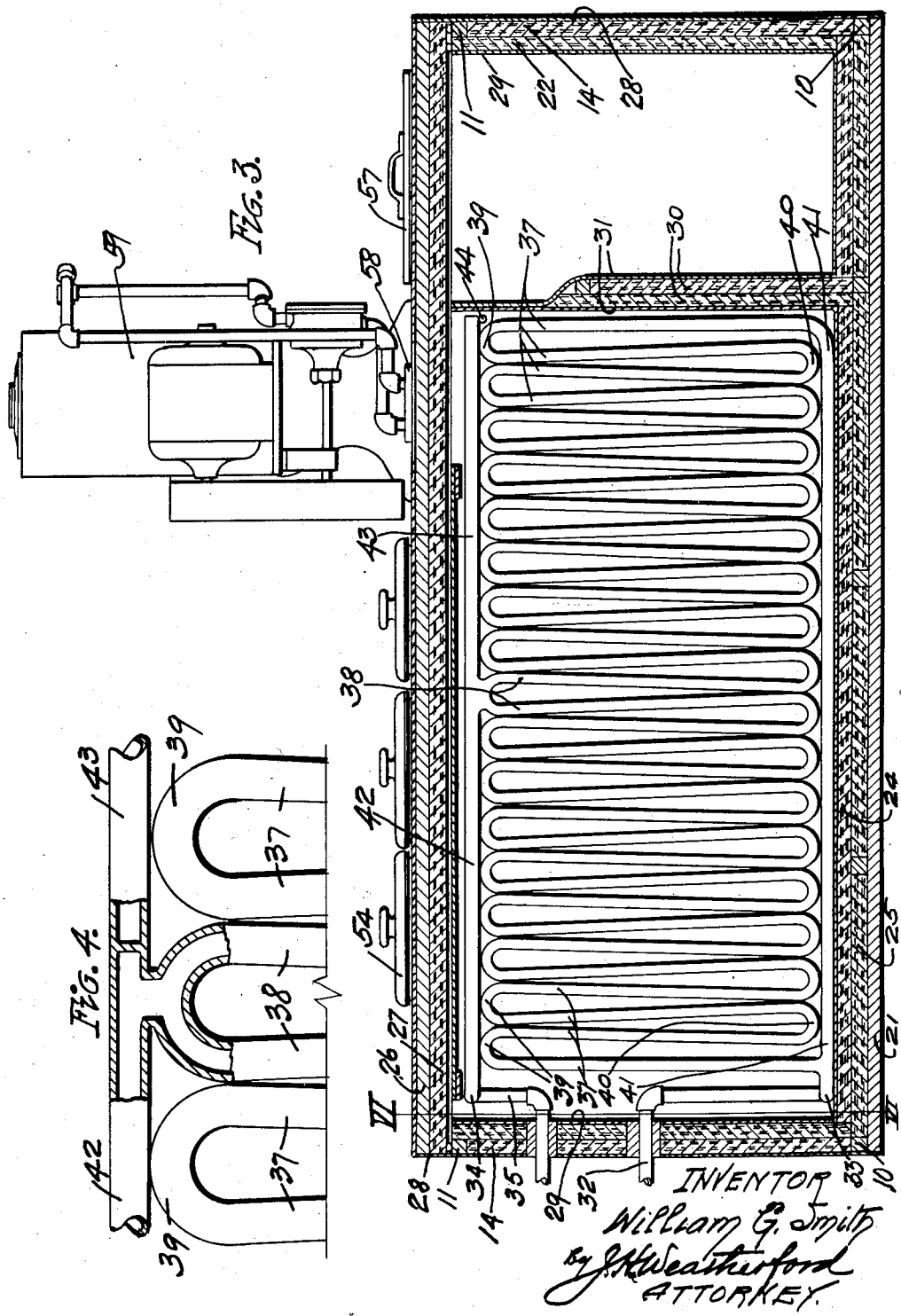
Fig. 2.

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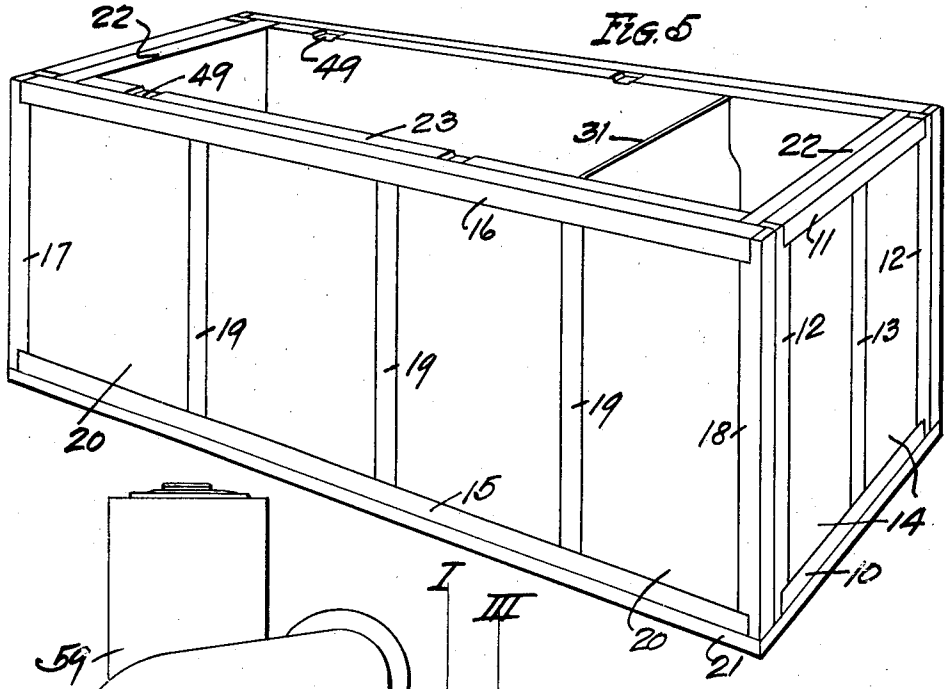


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ICE CREAM MAKING UNIT

Filed Feb. 27, 1928 3 Sheets-Sheet 3

Fig. 5



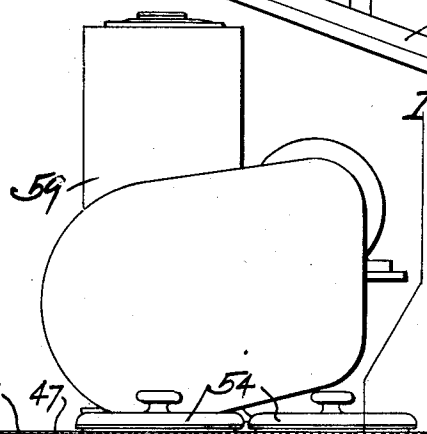
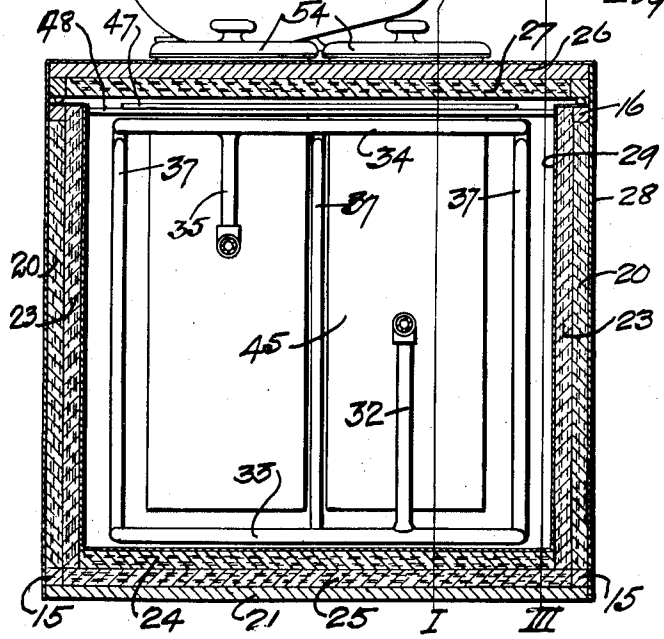


Fig. 6.



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UNITED STATES PATENT OFFICE

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ICE CREAM MAKING UNIT

Application filed February 27, 1928. Serial No. 257,236.

This invention relates to improvements in ice cream making units, and has especial relation to a refrigerating cabinet and the refrigerating and storing means within, especially designed for use in connection with an ice cream making machine.

The objects of this invention are:

(*a*) To provide a simple and efficient refrigerating cabinet;

(*b*) To provide a simple and efficient cabinet separated into compartments by a special designed division wall;

(*c*) To provide a new and efficient type of refrigerating coil;

(*d*) To provide an improved refrigerating can; and

(*e*) To provide an improved refrigerating unit embodying the above objects.

The means by which the above and other objects are accomplished, and the manner of their accomplishment, will readily be understood from the following specifications on reference to the accompanying drawings in which:

Fig. 1 is a longitudinal sectional elevation of the cabinet taken approximately on the center line of one of the rows of cans, being on the line I—I of Fig. 6;

Fig. 2 is an enlarged fragmentary detail showing the means for securing the cans in place;

Fig. 3 is a longitudinal sectional elevation of the cabinet along one of the coils, being on the line III—III of Fig. 6;

Fig. 4 is an enlarged fragmentary detail showing the manner in which the coils are connected into the upper longitudinal headers;

Fig. 5 is a perspective view showing the construction of the cabinet and the disposition of the insulating medium used;

Fig. 6 is a transverse section on the line VI—VI of Fig. 3.

Referring now to the drawings in which the various parts are indicated by numerals, the cabinet in its preferred form is substantially a rectangular box, having insulated walls, bottom and top, each end wall comprising a bottom rail 10, top rail 11, side posts 12, and preferably an intermediate vertical post 13, all preferably of wood, between which members are disposed filler sheets 14 of the insulating material such as cork, these sheets being of equal thickness with the frame members, and serving to brace the frame. The sides of the cabinet are each made up in substantially identical manner with bottom and top rails 15 and 16 respectively, end posts 17 and 18, and intermediate posts 19, between which members filler sheets of cork or other insulating material 20 are disposed, these sheets as before being of substantially the same thickness as the frame members.

The two end frames are assembled between the side frames so that the end frames brace the cabinet against transverse distortion and the sides are rigid against longitudinal distortion. The ends and sides are assembled on a bottom 21, preferably made up of closely jointed plank and the entire interior is lined with sheets of insulating cork, the end sheets 22 each being an integral piece extending from top to bottom and side to side, and the side lining 23 similarly extending from end to end and being in one piece. 24 is a similar single sheet of insulating for the bottom of the cabinet and 25 are filler sheets. The top of the cabinet is made up of closely jointed plank 26, lined with a sheet of insulating material 27. Preferably the exterior of the cabinet is covered with a sheet metal cover 28, which extends over the sides, ends and top. The interior of the cabinet has a sheet metal lining 29, which lining is water tight.

Intermediate the ends of the cabinet and nearer one end than the other, is a transverse division wall, which divides the case into divisions, or chambers of unequal size, the larger serving as a brine or freezing chamber, and the smaller as a storage or refrigerator chamber. The lower portion of the division wall is built up of sheet insulating material 30, over both sides of which is a metal lining 31, which metal lining extends to the top of the cabinet and is made water tight on both sides of the division wall. The insulated part of the wall is ordinarily about three fourths of the height

of the wall. This division wall therefore has a limited amount of radiating surface through which the storage chamber is cooled from the freezing chamber, but by reason of limited amount of radiating surface between the chambers the storage chamber is not cooled to nearly so low a temperature as is maintained in the freezing chamber.

By limiting the insulation to the lower part of this wall and leaving the upper part uninsulated the transfer of heat from storage chamber to the freezing chamber is accomplished only at the upper, and therefore warmer part of the storage chamber, and an even temperature may therefore be maintained therein. At the same time direct heat transference between the chambers is accomplished so that rapid response is made to effect re-cooling of the storage chamber when cans of milk or other relatively warm things are placed therein for preliminary chilling. Such rapid response may not be obtained by lessening the amount of insulation over the entire wall, nor may such uniform temperature be had by other positioning of the uninsulated wall.

Disposed within the freezing chamber are cooling coils, three being used in the cabinet illustrated. All three of these coils are supplied with an expansible cooling material such as ammonia gas, through an inlet pipe 32 and a lower cross header 33 and all three coils in turn discharge the gas through an upper cross header 34 and an outlet pipe 35.

The coils each comprise a number of substantially vertical risers 37 and 38. These risers are alternately connected at the top and bottom by U shaped return bends 39 and 40, so that a continuous coil with vertical legs is formed. The first and the last of the risers is connected at the bottom with a longitudinal supply header 41. The central pair 38 of the risers is connected into a longitudinal return header 42 through which flow is established to the upper cross header 34 and thence out through the pipe 35, so that as here illustrated each of the three coils comprises in reality two coils jointly fed and acting from the ends toward a joint discharge at the center.

When ammonia gas under compression is admitted through the inlet pipe 32 and the header 33 to the longitudinal header 41, it expands upward through the first and last of the vertical pipes 37 and from these pipes expands toward the central pair of pipes 38 from which it escapes through the return header 42, the upper cross header 34 and the outlet pipe 35 back to the compressor, not shown. In expanding upward through each vertical pipe in the coil, liquid which has not expanded is mechanically carried over each top U, and collects in the next bottom U from which U in turn it expands upward through the next riser and etc., thus setting up a series of successive expansions and in effect establishing as many expansion chambers as there are upper U's in the coil, and making an expansion coil which in practice has proved to be extremely efficient. It will be noted that the upper header 42 extends beyond the point at which the coil pipes 38 connect into the same, but this extension 42 and the cross member 44 serve the purpose only of bracing the upper portions of the coil, the remaining pipes of the coil having no connections into such header or cross member. All of the coil U's are mechanically connected to the top and bottom headers, to accomplish such bracing.

Also disposed within the brine chamber are a number of cooling cans each comprising an outer can 45 and an inner can 46. Each of the cans 45 is soldered or otherwise permanently connected to a metal sheet 47, which sheet is supported by cross members 48, which rest in grooves 49 (see Fig. 5) and anchor and support the outer cans 45. Each of the inner cans 46 is held down by an annular collar 50 which is secured to the top of the cabinet by a plurality of screws 51. These collars are each formed with an annular shoulder 52 which engages with the top edge of the inner can 46 and with an annular skirt 53, which fits within the can, so that the sleeves furnish a removable means for securing the holding down the inner can.

54 are insulated removable covers which provide access through the top of the cabinet, each top into one of the cans. 55 is a removable insulating pad which may be slipped within the top of a can and which ordinarily rests on the top of a container 56, shown dotted, which may have been placed within one of the cans 46. Preferably this pad is of felt or cork covered on all sides with canvas.

These pads being independent from the removable covers and ordinarily spaced slightly therefrom, effect a stoppage of the heat radiating through and along the walls of said removable covers and effected an insulation not otherwise obtained. It is found that with such auxiliary pads it is possible to effect a complete freezing of the can content as contrasted with the ordinary result so clearly seen in cakes of ice, in which a central V shaped portion of partially frozen material extends downward from the top.

57 is a cover providing access to the cooling chamber, and 58 is a cover providing access to the freezing chamber to allow filling the same with brine.

59 is an ice cream making machine which may be used in connection with the cabinet but does not form a part of this invention.

The apparatus herein before described may be used for refrigerating and cold

storage, but it is primarily designed for use in connection with an ice cream making machine or freezer.

In such use milk may be stored in the storage chamber where it will be kept cool but not frozen, the ice cream may be made in the machine indicated for the purpose, being ordinarily there chilled until it is of a mushy consistency, after which it is drawn off into individual containers or into cans such as the can 56 shown dotted in the drawings, which individual containers or cans are placed within the cans 46, are covered by the pads 55, and the covers 54 are then ready for the final freezing.

Previously the freezing tank has been filled with brine, which brine is chilled to a freezing temperature by means of refrigerant gas circulated through the coils disposed therein, and the final freezing of the cream is accomplished in such freezing chamber.

In circulating the refrigerant gas through the coils, the compressed gas is delivered through the inlet pipe 32 to the bottom cross header 33 through which header it flows to the longitudinal headers 41 and through these headers is delivered to the vertical risers 37 at both ends of the coil, and expands upward in such risers passing over the U 39, at the top of the risers and thence down through the next riser to the U 40, at the bottom. Any liquid passing over collects in such bottom U and from such U expands upward through the next riser, these successive expansions taking place progressively toward the central risers 38 through which the fully expanded gas is delivered to the top longitudinal header 42, and thence through the top cross header 34 and the discharge pipe 35, back to the compressor, completing the cycle and furnishing a desirable and efficient expansion coil.

In the can construction herein utilized, the exterior cans 45 are permanently built into and form a part of the cabinet initially holding back the surrounding brine, but where leakage occurs as it eventually does either from faulty construction, rusting, or mishandling, the repair of such cans requires the tearing down and rebuilding of the entire cabinet. In order to obviate this the removable cans 46 are used, these cans being held in place by the annular collars 50 and each being individually removable for repair or replacement. With such construction, even though the outer can becomes punctured, the inner can will still provide efficient service, and where such inner can becomes damaged or otherwise needs replacement, it can be individually removed and replaced without rebuilding the entire cabinet.

It will be seen too, that in using the cabinet the division wall between the freezing chamber and the storage chamber permits sufficient transfer of heat through the division wall to maintain the storage chamber at the desired temperature.

It will of course be understood that numerous changes may be made in the details of construction here shown and that I do not desire to confine myself to such details except as they may be hereinafter set out in the claims.

Having described my invention, what I claim is:

1. An expansion coil for refrigerating purposes, comprising a lower feeder header, an upper discharge header, a plurality of vertical risers connected alternately top and bottom by return U's into a continuous coil, the first and last of said risers being connected to said feeder header and the center pair of said risers to said discharge header.

2. An expansion coil for refrigeration purposes, comprising a continuous coil having vertically disposed legs, a feeder header connected to the first and last of said legs and a discharge header connected to the center pair of said legs.

3. An expansion coil for refrigeration purposes, comprising a lower feeder header, an upper discharge header, having a closed end, and co-extensive with said bottom header, a plurality of vertical risers connected alternately top and bottom by return U's into a continuous coil co-extensive with said headers, the first and last of said risers being connected to said feeder header and the center pair of said risers to said discharge header said coils being secured to and braced by said headers.

In testimony whereof I hereunto affix my signature.

WILLIAM G. SMITH.